

Attorney Docket No. 02135C/HG

**IN THE UNITED STATES PATENT
AND TRADEMARK OFFICE**

Applicant(s): Katsuhiro IWASAKI et al

Serial No. :

Filed : Concomitantly herewith

For : METHOD AND APPARATUS
FOR METAL SMELTING

**PRELIMINARY AMENDMENT FILED
CONCOMITANT WITH APPLICATION**

Assistant Commissioner for Patents
Washington, D.C. 20231

S I R :

Please amend the application as follows:

IN THE SPECIFICATION:

Page 1, below title and above "TECHNICAL FIELD", please
insert the following:

--This application is a continuation patent application of
International Application PCT/JP00/05916 filed August 31, 2000.--

IN THE CLAIMS:

The following amended claim 37 is identical to the claim in
the application starting on page 240, fifth line from the bottom
and continuing through page 241 and ending on page 242, line 2
which was erroneously identified as claim "36" instead the
correct number "37".

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Lori Valdes

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37. (Amended) A method for metal smelting comprising the steps of:

(A) preliminarily reducing a mixture of one or more of mixture of raw materials selected from the group consisting of following-given (a) through (c) in a prereduction furnace of rotary hearth type until a part of the metal oxide and/or the metal hydroxide is metallized;

(a) a mixture of raw materials prepared by mixing at least a carbonaceous material and a metal oxide and/or a metal hydroxide,

(b) a mixture of raw materials prepared by mixing and granulating at least a carbonaceous material and a metal oxide and/or a metal hydroxide, and

(c) a mixture of raw materials prepared by mixing and molding at least a carbonaceous material and a metal oxide and/or a metal hydroxide; and

(B) melting and finally reducing the mixture of raw materials, which is preliminarily reduced in the step (A), by charging thereof to a melting furnace using the carbonaceous material as a reducing agent, and using combustion heat of the carbonaceous material and combustion heat of carbon monoxide generated in the melting furnace as main heat source;

wherein, in the step (A), a charge consisting mainly of a powder and particle raw material (one or more of raw material selected from the group consisting of a mixture of raw materials, a metal oxide and/or a metal hydroxide, and a carbonaceous material) and/or a charge consisting mainly of powder and particles of an auxiliary raw material being charged to the melting furnace, or a charge consisting mainly of powder and particles of the powder and particle raw material and/or the

powder and particles of the auxiliary raw material, is charged onto the rotary hearth of the prereduction furnace, then granulates and/or molded forms of the mixture of raw materials are supplied to the upper layer of the charge at downstream side along the route of rotary hearth movement.

Please cancel claim 46 (first occurrence) which is set forth on page 245, the third and fourth lines from the bottom of the page.

Please add the following new claim 70:

70. (New) The method for metal smelting of claim 45, wherein the primarily crushed ore has particle sizes of from 0.1 to 1 mm.

REMARKS


The correction of the numbering of claim 37 is the obvious correction of an obvious error. The following claim is claim 38 and it depends from claim 37.

The claim originally identified as claim 46 on page 245, the third and fourth lines from the bottom of the page is cancelled and the same subject matter inserted as claim 70. Page 245 includes two claims 46. The first claim 46 was deleted because it is much shorter than the second claim 46 which remains.

A copy of pages 240, 241 and 242 are attached with page 240 being marked up to show the change to the claim which is presented herein as claim 37.

Entry of the present amendment is solicited.

Respectfully submitted,


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granulating at least a carbonaceous material and a metal oxide and/or a metal hydroxide, and

(c) a mixture of raw materials prepared by mixing and molding at least a carbonaceous material and a metal oxide and/or a metal hydroxide; and

(B) melting and finally reducing the mixture of raw materials, which is preliminarily reduced in the step (A), by charging thereof to a melting furnace using the carbonaceous material as a reducing agent, and using combustion heat of the carbonaceous material and combustion heat of carbon monoxide generated in the melting furnace as main heat source;

wherein the step (A) conducts preliminary reduction of the mixture of raw materials while forming a layer that contains not large amount of metal oxide and/or metal hydroxide at the lowermost layer part of the raw material layer on the rotary hearth of the prereduction furnace.

36. The method of metal smelting of claim 35, wherein the lowermost layer part of the raw material layer consists of an auxiliary raw material or consists mainly of a layer of auxiliary material being charged to the melting furnace.

37.
[36.] A method for metal smelting comprising the steps of:

(A) preliminarily reducing a mixture of one or more of mixture of raw materials selected from the group consisting of following-given (a) through (c) in a prereduction furnace of rotary hearth type until a part of the metal oxide and/or the

metal hydroxide is metallized;

(a) a mixture of raw materials prepared by mixing at least a carbonaceous material and a metal oxide and/or a metal hydroxide,

(b) a mixture of raw materials prepared by mixing and granulating at least a carbonaceous material and a metal oxide and/or a metal hydroxide, and

(c) a mixture of raw materials prepared by mixing and molding at least a carbonaceous material and a metal oxide and/or a metal hydroxide; and

(B) melting and finally reducing the mixture of raw materials, which is preliminarily reduced in the step (A), by charging thereof to a melting furnace using the carbonaceous material as a reducing agent, and using combustion heat of the carbonaceous material and combustion heat of carbon monoxide generated in the melting furnace as main heat source;

wherein, in the step (A), a charge consisting mainly of a powder and particle raw material (one or more of raw material selected from the group consisting of a mixture of raw materials, a metal oxide and/or a metal hydroxide, and a carbonaceous material) and/or a charge consisting mainly of powder and particles of an auxiliary raw material being charged to the melting furnace, or a charge consisting mainly of powder and particles of the powder and particle raw material and/or the powder and particles of the auxiliary raw material, is charged onto the rotary hearth of the prereduction furnace, then granulates and/or molded forms of the mixture of raw materials

are supplied to the upper layer of the charge at downstream side along the route of rotary hearth movement.

38. The method for metal smelting of claim 37, wherein, in the step (A), the particle size of the charge of powder and particles being charged onto the rotary hearth is in a range of from 0.05 to 10 mm.

39. The method for metal smelting of claim 37 or claim 38, wherein, in the step (A), the powder and particle charge being charged onto the rotary hearth is coal or a charge consisting mainly of coal.

40. The method for metal smelting of claim 37 or claim 38, wherein, in the step (A), the powder and particle charge being charged onto the rotary hearth is a non-fired auxiliary raw material or a charge consisting mainly of a non-fired auxiliary raw material.

41. The method for metal smelting of claim 37 or claim 38, wherein, in the step (A), granulates and/or molded forms of a mixture of raw materials which are charged to the upper layer of the charge on the rotary hearth are granulates and/or molded forms which are not treated by preliminary drying.

42. A method for metal smelting, comprising the steps of:

(A) preliminarily reducing a mixture of one or more of mixture of raw materials selected from the group consisting of

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